

**FIELD OBSERVATIONS ON THE LIFE HISTORY AND
BEHAVIOUR OF *JALMENUS EVAGORAS EUBULUS* MISKIN
(LEPIDOPTERA: LYCAENIDAE) IN THE SOUTHERN BRIGALOW
BELT OF QUEENSLAND**

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Abstract

Observations on the life history and behaviour of *Jalmenus evagoras eubulus* Miskin are described from an undisturbed forest in the southern brigalow belt of Queensland, supporting the larval host plant *Acacia harpophylla* F. Muell. ex Benth. (brigalow).

Introduction

The butterfly *Jalmenus evagoras eubulus* Miskin is one of two recognised subspecies of *J. evagoras* (Donovan) (Braby 2000). Unlike *J. e. evagoras*, which is distributed along the eastern coast and inland from Melbourne to just north of Gladstone (Common and Waterhouse 1981), *J. e. eubulus* inhabits brigalow-dominated forests and woodlands from central and southern inland Queensland to far northern New South Wales (Common and Waterhouse 1981). Under Queensland legislation, *J. e. eubulus* is considered vulnerable (State of Queensland 1994).

The main aims of this study were to verify the morphology of immature *J. e. eubulus* and to provide *in situ* descriptions of its breeding behaviour, myrmecophilous interactions and larval host preference.

Study site

Field observations were made on a previously unrecorded population of *J. e. eubulus* in a remnant patch of old growth brigalow on the eastern Darling Downs, SE Qld. All observations were made during the peak reproductive period from January to March 1999. The site is located approximately 130 km west of Toowoomba (AMG 304450E 6981000N) and exhibits a characteristic melonhole microtopography on an alluvial substrate.

Acacia harpophylla (brigalow) dominated both the tree and shrub canopies and was infrequently associated with *Eucalyptus populnea* (poplar box), *Santalum lanceolatum* (sandalwood) and *Casuarina cristata* (belah). Small shrub and herb layers comprised sparse covers of *Prostanthera* sp. (native mint), *Enchylaena tomentosa* (ruby saltbush), *Sclerolaena tetracuspis* (brigalow bur), *Commelina* sp. and *Portulaca* sp. Grass cover was dominated by *Panicum decompositum* (native millet).

Description of immature and adult stages

Egg. Similar to those of *J. evagoras* as described by Common and Waterhouse (1981) and Braby (2000). Eggs are bluish-white in colour, with a course pattern of ridges and short spines on the outer surface, radiating from a

darkened micropylar depression. Clusters of 6-15 eggs and/or choria were observed on the stem nodes, stem scars and stem axils of brigalow. No eggs were noted on leaves. Despite lengthy searching, no egg clusters were observed on other vegetation species within the study site.

First instar larva. Colour pink to pale orange dorsally; few pale hairs on dorsal surface; head, prothoracic and anal plates dark brown.

Second to final instar larvae. Colour dark brown to black in mature specimens; paired dark green, brown or black dorsal tubercules on mesothorax, metathorax and abdomen, more conspicuous in mature forms; often with light to shining green, yellow or red subspiracular band; pale, fine marginal hairs; head black; white or cream median line on black prothoracic plate; abdominal segments 7-9 somewhat flattened, gland on seventh abdominal segment conspicuous green or green-yellow; anal plate with minute pale hairs; posterior abdominal segments (7-10) often bordered by a green or yellow subspiracular band; ventral surface pale; thoracic legs dark brown to black, prolegs pale.

Pupa. Glossy dark brown to black; segments, veins, spiracles and often appendages defined by conspicuous orange or light brown bands. Girdle present.

Adult. All adult *J. e. eubulus* observed were similar to nominate *J. e. evagoras*, except for subtle differences in their central wing colouration and banding on the undersides of the wings. *J. e. eubulus* adults had very pale whitish blue- or green-tinted wings with narrow black bands beneath. In comparison, *J. e. evagoras* adults had metallic bluish-green colours on the wings with broad black bands beneath.

Adult behaviour

Adult flight activity in *J. e. eubulus* increased from mid-morning and remained constant throughout the afternoon until dusk, at which time it reduced rapidly. Both males and females were observed in flight and at rest on mature brigalow trees, shrubs and juvenile plants of heights between 0.5 and 17 m. Males were often seen resting in overhanging vegetation above host plants. Adult emergence occurred in the early morning between 0900 and 1000 h and males were regularly observed in flight or at rest close to other pupae.

Copulation in *J. e. eubulus* was observed on four occasions at the study site. Prior to mating a single male or group of males circled a female (which was stationary on the host plant) before landing next to her (within 5 cm). A receptive female responded with wing fluttering and slow spins and then by exposing her abdomen to the successful male.

Copulatory behaviour appeared similar to that in *J. e. evagoras*, with the male extending its genitalia along the length of the female abdomen before

engaging and assuming a tail-to-tail position. Pairs remained *in-copula* for up to 35 minutes, although periods of over 3 h have been recorded for *J. e. evagoras* (Pierce and Nash 1993), and were stationary on the host plant for the duration. All mating observed was between 1030 and 1330 h, although courtship behaviour was noted before and after these times.

Some females were mated directly after eclosion and often before the wings had fully expanded and dried. An extreme case was noted where a female was mated even before releasing the meconium. Upon discharge of the liquid, males flying in the vicinity became very active and attempted to engage the female who, in response, held her abdomen in a slightly upright position. The group of males dispersed soon after and no further mating in the described female was noted.

At 1500 h on the same day, a female with a noticeably swollen abdomen landed on a host plant and appeared to actively search sections of leaves and stems using extended tarsi. This behaviour continued for approximately three minutes before she began laying eggs in a stem axil.

The oviposition site was 30 cm above ground on a juvenile brigalow 1.2 m high. Three similar oviposition locations (two stem nodes and a stem scar each at 0.3 to 0.5 m above ground) were selected on the same plant by the female described above. Host plants selected for oviposition had the attendant ant present, or remnants of the previous season's exuviae. This has also been noted for *J. e. evagoras* (Pierce & Nash 1999).

Males were regularly involved in territorial disputes with other *J. e. eubulus* males as well as different butterfly species (including *Papilio aegaeus* Donovan and *Belenois java* L.), birds and humans. As with *J. e. evagoras*, this behaviour was often followed by the defending male returning to a rest position above the host plants which contained immatures. The activity also appeared to be damaging to the males, causing deterioration of the wings over a period of time, similar to that reported for *J. e. evagoras* (Pierce and Nash 1999).

Larval behaviour

Larvae sheltered on the undersides of stems, leaf petioles and leaves at night and in the early morning. During the day, early and late instar larvae fed on mature leaves, growing leaf tips and fresh shoots of juvenile brigalow plants up to 5.0 m in height. Feeding continued until dusk. Unlike *J. e. evagoras*, which congregate into feeding clusters, *J. e. eubulus* were solitary when feeding and clustered after dusk.

Larval feeding sites on the host plant included fresh growth at both ground level (off the main stem) and on the apical meristems of crowns. Food plants with larvae present were often conspicuously defoliated.

Pupation occurred solitarily on brigalow host leaves at heights up to 5.0 m.

Both larvae and pupae were always attended by a small, fast-moving species of *Iridomyrmex* ant (Common and Waterhouse 1981), most likely in the *anceps* group (R. Eastwood, pers. comm.) which attends *J. e. evagoras* (Pierce and Nash 1999). The relationship between the ant and the immature stages of *J. e. evagoras* is mutualistic (Pierce *et al.* 1987, Pierce and Nash 1999) and may be similar for *J. e. eubulus*.

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